NOISE REMOVAL METHODOLOGIES FOR LUNG CANCER DIAGNOSIS

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I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Graphic and Multimedia Technology).

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRACT

Noise reduction is the one of the step in image processing where the process of reducing noise from an image. The noise present in the images such as in a medical image like Salt and Paper Noise, Gaussian Noise and others. Different noises have their own characteristics which make them identifiable from others. However, enhanced the image especially the medical images is required by doctors to help the diagnosis and interpretation because lack of images quality due to the noise. The methods of noise removal was be analysed from existing paper in literature review. Based on the existing paper, each of the method had their own benefits and drawbacks. Therefore, the uses of suitable method is important to improve the quality of medical image for early diagnosis of lung cancer. In this paper, Gaussian Filter and Median Filter is proposed for removing the noise from CT scan images. The objective of the study is to implement and develop the method of noise removal for lung cancer diagnosis. The development research methodology presented five fundamental stage which are investigation of existing method of noise removal, developing a new method for noise removal, implementation of the noise removal method, verification and validation. Therefore, the algorithm will be developed and implemented in MATLAB software. Then, the method will be tested and verified to detect the cancer in the lung image. The result of CT scan image of lung cancer were showed and to validated the performance of this proposed method.

ABSTRAK

Pengurangan bunyi adalah salah satu langkah dalam pemprosesan imej di mana proses mengurangkan bunyi dari imej. Bunyi yang hadir dalam imej seperti dalam imej perubatan seperti Bunyi dan Saluran Kertas, Bunyi Gaussian, Bunyi Speckle dan Bunyi Berkala. Suara yang berbeza mempunyai ciri-ciri mereka sendiri yang membuat mereka dapat dikenali dari orang lain. Walau bagaimanapun, peningkatan imej terutamanya imej perubatan diperlukan oleh doktor untuk membantu diagnosis dan penafsiran kerana kekurangan kualiti imej disebabkan bunyi bising. Kaedah penyingkiran hingar akan dianalisis dari kertas sedia ada dalam kajian literatur. Berdasarkan kertas sedia ada, setiap kaedah mempunyai manfaat dan kelemahan mereka sendiri. Oleh itu, penggunaan kaedah yang sesuai adalah penting untuk meningkatkan kualiti imej perubatan untuk diagnosis awal kanser paru-paru. Dalam kertas ini, Penapis Gaussian dan Penapis Median dicadangkan untuk mengeluarkan bunyi bising daripada imej imbasan CT. Objektif kajian ini adalah untuk melaksanakan dan membangunkan kaedah penyingkiran hingar untuk diagnosis kanser paru-paru. Metodologi penyelidikan pembangunan membentangkan lima peringkat asas yang menyiasat kaedah penyingkiran hingar yang sedia ada, membangunkan kaedah baru untuk penyingkiran bunyi bising, pelaksanaan kaedah penyingkiran bunyi, pengesahan dan pengesahan. Oleh itu, algoritma akan dibangunkan dan dilaksanakan dalam perisian MATLAB. Kemudian, kaedah itu akan diuji dan disahkan untuk mengesan kanser pada imej paru-paru. Hasil CT scan terhadap kanser paru-paru menunjukkan dan mengesahkan prestasi kaedah yang dicadangkan ini.

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LIST OF ABBREVIATIONS

MATLAB	MATRIX LABORATORY
CT Scan	Computer Tomography Scan
PSMF	Progressive Switching Median Filter
ACWMF	Adaptive Centre Weighted Median Filter
DBA	Decision Based Algorithm
AMF	Adaptive Median Filter
BDND	Boundary Discriminative Noise Detection
FEMF	Fast and Efficient Median Filter
MDBUTMF	Modified Decision Based Unsymmetrical Trimmed Median Filter
SWT	Stationary Wavelet Transform
SSLGD	Soft-Switching Local Graph Denoising
PSNR	Peak Signal-to-Noise Ratio
SSIM	Structural Similarity Index
ANCLPVMF	Adaptive Non-Causal Linear Prediction Based Vector Median Filter
SVM	Support Vector Machine
MHFC	Modified Histogram Based Fuzzy Color
W-SOMP	Weighted-Simultaneous Orthogonal Matching Pursuit
WJSR	Weighted Joint Sparse Representation
MRI	Magnetic Resonance Imaging
MR	Magnetic Resonance
SD	Static or Dynamic

RGB	Red Green Blue
NIR	Near-Infrared
DIC	Differential Interference Contrast
PMRI	Parallel Magnetic Resonance Imaging
SNR	Signal-to-Noise Ratio
AVMF	Adaptive Vector Median Filter
WMF	Weighted Mean Filter

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Lung cancer is one of the deadly sicknesses that principally influence the aspiratory knobs of the lungs. Examination of picture is by and by a basic advance of the lung diseases like analytic, prognostic and development. The survival rate of lung cancer is low when contrasted and every single other kind of growth. The requirement for recognizing lung cancer at a beginning period is extremely basic and is a dynamic research territory in the field of medical image processing. A few Computer supported frameworks have been expected to recognize the lung cancer at the initial stage. Different kinds of images are utilized for detection of lung diagnosis. Madhura & Babu [12] presented the most imperative testing undertaking is discovery of lung nodule. Registered Tomography (CT) pictures are for the most part picked because of less mutilation, low commotion, better clearness, less time utilization and ease. The figure 1 shows the original image of lung cancer in CT scan and figure 2 shows the simulation result of lung CT scan image corrupted with 90 % Salt and Pepper noise (A) Original, (B) Noisy, (C) PSMF, (D) ACWMF, (E) DBA, (F) AMF, (G) BDND, (H) FEMF, (I) MDBUTMF, (J) Proposed.

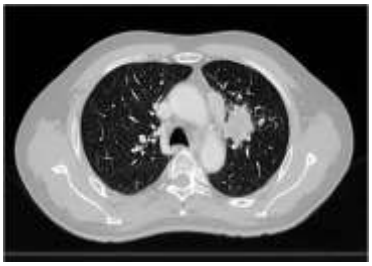

Figure 1. *CT-scan image.*

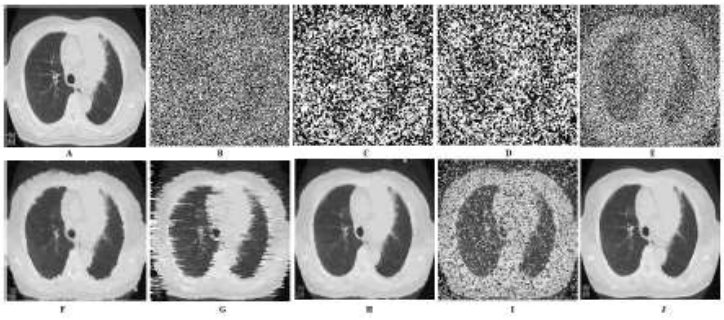

Figure 2. Simulation Results for Lung CT Scan Image Corrupted with 90% Salt and Pepper noise (A) ORIGINAL (B) NOISY (C) PSMF (D) ACWMF (E) DBA (F) AMF (G) BDND (H) FEMF (I) MDBUTMF (J) PROPOSED.

Nowadays, image processing is one of the most growing research areas especially in medical field. Noise removal is the one of the step in image processing where the process of removing noise from a signal. There her are many types of the noise present in the images especially in medical image for the lung cancer diagnosis like salt and paper noise, Gaussian noise, speckle noise and periodic noise. Different noises have their own characteristics which make them identifiable from others. Every medical image have noise that need to be removed to enhance the image and to diagnosis the analysis of image. Therefore, noise can be removed by using noise removal method like minimum filtering, maximum filtering, mean filtering, linear filtering, median filtering and averaging filtering. Noise removal from images is the most active field of research. This research presents the review on the lung cancer, types of noise in medical image and the methods for the noise removal.

1.2 PROBLEM STATEMENT

Noise removal method is uses to enhance the image and help the doctors to detect the cancer earlier before it become worst. The doctors may have a difficulty to interpret the image of cancer because of the noise. Then, enhanced medical images required by surgeons to help the diagnosis and interpretation because lack of images quality due to the noise. So, noise removal method is important for image processing to improve the quality of medical image for early diagnosis. The target due to the

enhancement is to solve the problems of the high level noise in medical images. Therefore, we want to solve the problem by using proposed noise removal method from lung cancer image.

1.3 AIM OF OBJECTIVE

1. To study the type of noise removal method from image for lung cancer diagnosis included Gaussian Filter and Median Filter.
2. To develop the combination method of noise removal for lung cancer diagnosis.
3. To evaluate the performance of combination method of noise removal for lung cancer diagnosis.

1.4 SCOPE

This work described the type of noise like Gaussian and salt & pepper. Besides, the combination of noise removal method like Gaussian High Pass Filter and Median Filter was tested. This method was used to enhance the image of lung cancer and helps the doctors and medical department to get the better diagnosis. The algorithm will be implemented in MATLAB. Then, the method will be tested to check their performance by using 20 colour CT Scan images from Cancer Imaging Archive.

1.5 THESIS ORGANIZATION

This thesis consists of three chapters. Chapter 1 was discussed the introduction of the project; chapter 2 was discussed the literature review of this project; chapter 3 was provided the methodology that used in this project; chapter 4 was provided the result and discussion; and chapter 5 was summarized the project report.

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